UNITED STATES DEPARTMENT OF COMMERCE
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR		ATTORNEY DOCKET NO.
09/416,165	10/11/99	KANATZIDIS	M	6550-000022

IM62/1107

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EXAMINER	
KOSLOW,C	

ART UNIT	PAPER NUMBER
1755	

DATE MAILED: 11/07/00

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary	Application No. 09/416,165	Applicant(s) KANATZIDIS ET AL.	
	Examiner C. Melissa Koslow	Art Unit 1755	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3,5,7-12,14,16-24 and 29-31* is/are rejected.

7)☒ Claim(s) *2,4,6,13,15 and 25-28* is/are objected to.

8)☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved.

12)☒ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

a)☐ All b)☐ Some * c)☐ None of the CERTIFIED copies of the priority documents have been:

1.☐ received.

2.☐ received in Application No. (Series Code / Serial Number) _____ .

3.☐ received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☒ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. & 119(e).

Attachment(s)

15) ☒ Notice of References Cited (PTO-892)
16) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
17) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4 .
18) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
19) ☐ Notice of Informal Patent Application (PTO-152)
20) ☐ Other: .

The oath or declaration is defective. A new oath or declaration in compliance with 37 CFR 1.67(a) identifying this application by application number and filing date is required. See MPEP §§ 602.01 and 602.02.

The oath or declaration is defective because:
Non-initialed and/or non-dated alterations have been made to the oath or declaration. See 37 CFR 1.52(c).

Applicant has not complied with one or more conditions for receiving the benefit of an earlier filing date under 35 U.S.C. 119(e) as follows:

An application in which the benefits of an earlier application are desired must contain a specific reference to the prior application in the first sentence of the specification (37 CFR 1.78).

The disclosure is objected to because of the following informalities: On page 3, line 6, "Ga" should be "Ba". On page 3, lines 3 and 36, and on page 9, lines 17-19, the phrase "group consisting essentially of" should be "group consisting of". Appropriate correction is required.

Claim 23 is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention.

The specification does not support the subject matter of claim 23. Page 9, lines 9-11 teaches doping the compound with one dopant, while claim 23 claims doping with at least one dopant. This discrepancy needs to be corrected.

Claims 1, 12, 17, 22 and 24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1, 12, 22 and 24 are indefinite since the variables n and m are not defined. A claim 17 is indefinite as to the definition of "NaCl-like". It is suggested to replace this phrase with "NaCl-type" to correspond with the phrasing in the rest of the disclosure.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 3, 5, 7, 11, 12, 14, 17, 18, 21-24 and 29-31 are rejected under 35 U.S.C. 102(b) as being anticipated by Wernick.

This reference teaches semiconductive thermoelectric compounds having the formulas $(AgSbTe_2)_{1-x}(PbTe)_x$, $(AgSbTe_2)_{1-x}(PbSe)_x$, $(AgSbSe_2)_{1-x}(PbTe)_x$, $(AgSbSe_2)_{1-x}(PbSe)_x$, $(AgBiSe_2)_{1-x}(PbTe)_x$ and $(AgBiSe_2)_{1-x}(PbSe)_x$, where x is 0.05-0.9. These formulas can be rewritten as the following single formula $Ag_{1-x}Pb_xM_{1-x}Q$, where M is Sb or Bi and Q is Te_3 (where M is Sb), Se_3 (when M is Sb or Bi) $Te_{2(1-x)}Se_x$ (when M is Sb) or $Se_{2(1-x)}Te_x$ (when M is Sb or Bi). The taught formulas all fall within the claimed formula. The taught compounds are used in thermoelectric devices, which are also semiconductive devices. While the reference does not teach the crystal lattice of the taught compound, one of ordinary skill in the art would expect to the taught compound to inherently have a NaCl-type cubic lattice since the taught compounds fall within the claimed formula. Column 6, lines 7-17 teach producing p-type or n-type

semiconductors by doping the taught compounds with p-type or n-type dopants in the conventional dopant amounts. One of ordinary skill in the art would be expected to know the claimed amounts of n-type dopants in thermoelectric compounds fall within the conventional n-type dopant range for thermoelectric compounds. Thus, the taught dopant amounts include those claimed. While the reference does not define the p-type dopant, it is well known in the art that the p-type dopant is an element which substitutes from one of the taught elements and which has a smaller number of electrons in its outer shell. Thus, the p-type dopants for the taught compounds are known to be selected from Group IVA metals, which substitute for Sb and Bi, and Group IIIA metals, which substitute for Pb, GE and/or Sn. These groups include the dopants claimed. The claimed materials and devices read upon those taught.

Claims 1, 3, 7, 11, 12, 16-18, 21-24 and 29-31 are rejected under 35 U.S.C. 102(b) as being anticipated by Rupprecht.

This reference teaches semiconductive thermoelectric compounds having the formulas $Ag_{x/2}Pb_{1-x}Sb_{x/2}Te$, $Ag_{x/2}Ge_{1-x}Sb_{x/2}Te$ and $Ag_{x/2}(Pb_{1-y}Ge_y)_{1-x}Sb_{x/2}Te$, where $0<x<1$ and $0<y<1$. The taught formulas all fall within the claimed formula. The taught compounds are used in thermoelectric devices, which are also semiconductive devices. While the reference does not teach the crystal lattice of the taught compound, one of ordinary skill in the art would expect to the taught compound to inherently have a NaCl-type cubic lattice since the taught compounds fall within the claimed formula. Column 2, lines 40-43 teach producing p-type or n-type semiconductors by doping the taught compounds with p-type or n-type dopants in the conventional dopant amounts. While the reference does not define the p-type dopant, it is well known in the art that the p-type dopant is an element which substitutes from one of the taught

elements and which has a smaller number of electrons in its outer shell. Thus, the p-type dopants for the taught compounds are known to be selected from Group IVA metals, which substitute for Sb and Bi, and Group IIIA metals, which substitute for Pb, GE and/or Sn. These groups include the dopants claimed. One of ordinary skill in the art would be expected to know the claimed amounts of n-type dopants in thermoelectric compounds fall within the conventional n-type dopant range for thermoelectric compounds. The taught dopant amounts include those claimed. The claimed materials and devices read upon those taught.

Claims 1, 3, 7, 11, 12, 16-18, 21-24 and 29-31 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 3,211,655.

This reference teaches semiconductive thermoelectric compounds having the formulas $Ag_{x/2}(Pb_{1-y}Sn_y)_{1-x}Sb_{x/2}Te$ and $Ag_{x/2}(Pb_{1-y}Sn_y)_{1-x}Bi_{x/2}Te$, where $0.4<x<1$ and $0<y<1$. The taught formulas all fall within the claimed formula. The taught compounds are used in thermoelectric devices, which are also semiconductive devices. While the reference does not teach the crystal lattice of the taught compound, one of ordinary skill in the art would expect to the taught compound to inherently have a NaCl-type cubic lattice since the taught compounds fall within the claimed formula. Column 3, lines 60-63 teach producing p-type or n-type semiconductors by doping the taught compounds with p-type or n-type dopants in the conventional dopant amounts. While the reference does not define the p-type dopant, it is well known in the art that the p-type dopant is an element which substitutes from one of the taught elements and which has a smaller number of electrons in its outer shell. Thus, the p-type dopants for the taught compounds are known to be selected from Group IVA metals, which substitute for Sb and Bi, and Group IIIA metals, which substitute for Pb, GE and/or Sn. These groups include the dopants claimed. One of

ordinary skill in the art would be expected to know the claimed amounts of n-type dopants in thermoelectric compounds fall within the conventional n-type dopant range for thermoelectric compounds. The taught dopant amounts include those claimed. The claimed materials and devices read upon those taught.

Claims 1, 3, 5, 7, 11, 12, 14, 17, 18 and 21 rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 3,238,134.

This reference teaches semiconductive thermoelectric compounds having the formulas $Ag_{x/2}Pb_{1-x}Sb_{x/2}Te$, $Ag_{x/2}Pb_{1-x}Bi_{x/2}(Te_{1-y}Se_y)$ and $Ag_{x/2}Pb_{1-x}Sb_{x/2}(Te_{1-y}Se_y)$, where $0<x<1$ and $0<y<1$. The taught formulas all fall within the claimed formula. The taught compounds are used in thermoelectric devices, which are also semiconductive devices. While the reference does not teach the crystal lattice of the taught compound, one of ordinary skill in the art would expect to the taught compound to inherently have a NaCl-type cubic lattice since the taught compounds fall within the claimed formula. The taught dopant amounts include those claimed. The claimed materials and devices read upon those taught.

Claims 1, 3, 7 and 11 are rejected under 35 U.S.C. 102(b) as being anticipated by Skrabek et al.

This reference teaches semiconductive thermoelectric compounds having the formula $Ag_{1-x}Ge_xSb_{1-x}Te_3$, where x is 0.5-0.9. The taught formulas all fall within the claimed formula. The taught compounds are used in thermoelectric devices, which are also semiconductive devices. This reference teaches when x is in the range of 0.5-0.75, the compound has a NaCl-type cubic lattice (col. 4, lines 64-66). The claimed materials and devices read upon those taught.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 8 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fraden in view of Wernick, Rupprecht, U.S. Patent 3,211,656, U.S. Patent 3,238,134 and Skrabek et al.

Fraden teaches, in column 1, lines 36-59, IR sensors, or detectors, which contain thermoelectric detectors. The composition of the thermoelectric material in the thermoelectric detector in the taught IR detector is not taught. This indicates any known thermoelectric material can be utilized. Therefore, one of ordinary skill in the would have found it obvious to use at least one of the thermoelectric materials taught in Wernick, Rupprecht, U.S. Patent 3,211,656, U.S. Patent 3,238,134 and Skrabek et al in the thermoelectric detector in the taught IR detector. The references suggest the claimed device.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Iwanczyk et al in view of Wernick, Rupprecht, U.S. Patent 3,211,656, U.S. Patent 3,238,134 and Skrabek et al.

Iwanczyk et al teaches a radiation imaging detector which contains thermoelectric cooler (col. 9, line 66-col. 10, line 2). The imaging detector can be a multispectral detector (col. 10, lines 27-29). The composition of the thermoelectric material in the thermoelectric cooler in the taught detector is not taught. This indicates any known thermoelectric material can be utilized. Therefore, one of ordinary skill in the would have found it obvious to use at least one of the thermoelectric materials taught in Wernick, Rupprecht, U.S. Patent 3,211,656, U.S. Patent

3,238,134 and Skrabek et al in the thermoelectric cooler in the taught detector. The references suggest the claimed device.

Claims 9 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Parise or Tateishi et al, each in view of Wernick, Rupprecht, U.S. Patent 3,211,656, U.S. Patent 3,238,134 and Skrabek et al.

Parise and Tateishi et al teach photovoltic devices which contain a thermoelectric cooler (Parise: claims; Tateishi et al: col. 6, lines 45-47). The composition of the thermoelectric material in the thermoelectric cooler in the taught detector is not taught. This indicates any known thermoelectric material can be utilized. Therefore, one of ordinary skill in the would have found it obvious to use at least one of the thermoelectric materials taught in Wernick, Rupprecht, U.S. Patent 3,211,656, U.S. Patent 3,238,134 and Skrabek et al in the thermoelectric cooler in the taught photovoltic devices. The references suggest the claimed device.

Claims 2, 4, 6, 13, 15 and 25-28 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

There is no teaching or suggestion in the cited art of record of a conductive material having the claimed formula where n and m are integers; where A is K, M' is Bi and M is Sn or Pb; where A is at least two elements selected from Li, Na, Rb, Cs, Tl and Ag or where M' is Bi and Sb. There is no teaching or suggestion of a n-type conductive material having the claimed formula and where the dopant is a metal halide, where the metal is selected from Sb, Bi, Hg, Cr, Mn, Fe, Co, Ni, Cu, Zn and Mg.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Melissa Koslow whose telephone number is (703) 308-3817.

The examiner can normally be reached on Monday-Thursday from 7:30 AM to 4:00 PM. The examiner can also be reached on alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Bell, can be reached at (703) 308-3823.

The fax number for Amendments filed under 37 CFR 1.116 or After Final communications is (703) 872-9311. The fax number for all other official communications is (703) 872-9310.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0661 or (703) 308-0662.

cmk
November 3, 2000

C. Melissa Koslow
Primary Examiner
Tech. Center 1700